

Initial	Date

BA/WTR
WR SD
Mail Stop 60189

JUL 31 1996

Memorandum

To: GARD, North Dakota/South Dakota
Attention: Maury Wright

From: Chief, Division of Water Resources

Subject: 1995-1996 Annual Water Use Report/Management Plan

The subject report for Lake Andes National Wildlife Refuge has been reviewed and approved.

Please extend our thanks to Refuge personnel for submission of this report.

/S/ GEORGE A. SMITH

bcc:WTR rf
RO rf
WR:LCo:lc:7/24/96



UNITED STATES GOVERNMENT
MEMORANDUM
U.S. FISH & WILDLIFE SERVICE

DATE: June 18, 1996

TO: Maury Wright, Fisheries and Refuge Supervisor
Denver Regional Office

FROM: Sylvia R. Pelizza, Refuge Manager
Lake Andes NWR Complex

SUBJECT: 1996 Water Management Plan

Attached you will find our 1996 Water Management Plan. Jay had given it to me in January for review and it sat in my box, buried, until now.

I did revise the plan to reflect the management we are currently implementing, particularly the Owens Bay and Broken Arrow Units.

Sorry it is late. Let me know if any additional information is needed.


Sylvia R. Pelizza

**1996 ANNUAL WATER MANAGEMENT PLAN
AND
1995 WATER CONDITIONS AND USAGE**

**LAKE ANDES NATIONAL WILDLIFE REFUGE COMPLEX
LAKE ANDES, SD**

WATER UNIT: Lake Andes

I. Introduction

Lake Andes is a 4730 acre meandered lake whose water level depends entirely upon annual runoff. Two dikes divide the lake into three units, the North, Center, and South. Stop-log water control structures are located within each dike; however, the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962.

Unit	Drainage Area Acres		Surface Acres of Water	Water Capacity (Acre Feet)	Depth/full	
					Max	Avg
South	20,000	24%	1,760	16,159	13.5	11.5
Center	11,000	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,000	100%	4,730	37,174	--	--

In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artificial outlet on the South Unit. This level was established following local complaints about flooding around the lake. The Fish and Wildlife Service received the right to flood the meandered lake bed of Lake Andes in an easement acquired in 1939 from the State of South Dakota.

II. Objectives

As long as water is present in Lake Andes, it is utilized by water dependent wildlife species year-round. It serves primarily as a roost and stop-over for migrating waterfowl. Good brood habitat is provided in the North Unit in good, wet years. The objective for Lake Andes is to provide as much habitat as possible for nesting and migrating waterfowl under current weather conditions.

III. 1995 Water Conditions

Total precipitation for 1995 was 31.36 inches, 9.99 inches above normal. The winter was relatively mild and open with sporadic moderate snowfalls. Minor snowmelt runoff contributed to the partial filling of all three units. Precipitation after ice-out was excessive resulting in significant increases in pool water elevations. The lake filled and remained at levels above the high water elevation of 1437.25 feet msl until freeze-up.

<u>1995 Lake Andes Water Levels - Feet MSL</u>			
<u>Date</u>	<u>North Unit</u>	<u>Center Unit</u>	<u>South Unit</u>
02/01	FROZEN	FROZEN	FROZEN
03/12	ICE OUT	ICE OUT	ICE OUT
03/15	1435.5	1435.3	1435.3
04/19	1437.0	1436.0	1436.0
05/12	1439.5	1439.1	1438.7
06/02	1441.3	1441.3	1441.3
10/04	1437.7	1437.6	1437.6
11/22	1437.5	1437.4	1437.4
11/28	FROZEN	FROZEN	FROZEN

IV. Ecological Effects of the Past Years Levels on Lake Andes

Lake Andes is rebounding from the drought period from 1987 through 1992. During this time, all three units came very close to becoming void of water. The low water conditions resulted in an increase in aquatic vegetation throughout the lake. In addition, limited rough fish control was achieved by fish die offs in both the winter and summer periods of 1992 and 1993. The remaining rough fish were primarily found in the south unit.

Heavy precipitation occurred early in 1993 resulting in significant runoff events causing significant increases in water elevations in both the north and center units. Water clarity increased dramatically in the center unit due primarily to a reduced rough fish population and increased aquatic plant community. Water clarity in the south unit remained low with respect to the center unit. Waterfowl were selecting the center unit for their daily needs. Other water bird use also selected the center unit for forage, nesting, and loafing areas.

In 1995, all three units of Lake Andes were above the established high water mark resulting in deep water lake conditions. This type of water condition supported populations of diving ducks and other diving water birds. Limited back water areas provided good pairing and wading habitat for other waterfowl and shorebirds. Colonial nesting birds capitalized on the flooded young cottonwood trees that provided excellent nesting sites and forage areas. These conditions were maintained throughout the nesting season for all species mentioned. Rough fish populations have also greatly increased

and are impacting the submerged aquatic vegetation and water quality in all three units of Lake Andes.

V. 1996 Water Management Objectives

Management objectives for 1996 are to contain as much runoff as possible in Lake Andes. The stop-logs at the outlet structure on the South Unit will be maintained at the 1437.25 feet msl elevation mandated by Congress. Excess water will continue to be released by overflow.

WATER UNIT: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit separated by a dike from the South Unit of Lake Andes. A stop-log water control structure is located in this dike to allow water releases into Lake Andes. This Unit also includes three man-made ponds (Prairie Ponds) which are located along the northwest shore of Owens Bay.

Owens Bay, in addition to water from natural runoff, is maintained by a free flowing artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing reduced the well opening from 12 inches to 8 inches and dropped the flow to approximately 450 gpm.

In 1986, Ducks Unlimited funded the drilling of a new 12 inch artesian well and the old well was capped. The new well has a 800-1000 gpm flow. The well distribution box and pipeline supplying the Prairie Ponds were also replaced. In 1987, the four water control structures on the Prairie Ponds were retrofitted with new screw gates.

II. Objectives

Owens Bay water management objectives are to provide emergent marsh conditions on one-half of the unit (shallow water margins) with an overall water/vegetation interspersation rate of 50% and open water habitat on the other half of the unit that supports adequate submerged aquatic bed resources which are available to nesting hens and ducklings. Waterfowl production is the primary objective on Owens Bay. Secondary objectives include providing waterfowl migrational habitat and benefits for marsh and water birds, shorebirds, gulls, terns, and resident wildlife.

III. 1995 Water Conditions

Spring snowmelt and heavy precipitation resulted in the bay reaching pool capacity in late March. The pool remained full through the end of the year with water levels varying only a few inches. The pool was full at freeze-up.

Under normal precipitation conditions, water losses to evaporation and percolation cannot be completely offset by the artesian well which has a flow of 800-1000 gpm. Fortunately, this year, we did not have to worry too much about water losses.

1995 Water Levels - Owens Bay

<u>Date</u>	<u>Water Level</u>
03/12	FROZEN
03/15	1441.7
04/19	1442.6
05/12	1443.7
10/04	1442.4
Pool Bottom	1436.52
Full Pool Elevation	1442.12

IV. Ecological Effects of the Past Years Levels on Owens Bay

The pool level remained high throughout 1995 resulting in many increased wildlife uses. The heron and egret colony established in 1995 was again heavily used by cattle egrets, great egrets, great-blue herons, and black-crowned night herons. This colony was made possible by cottonwood trees becoming established at the perimeter of the Bay during the previous drought years and subsequent reflooding. In addition, muskrats have increased dramatically from less than ten huts counted in 1991 to well over 100 huts counted in 1995.

The muskrats are a good indicator of the emergent vegetation existing within the Bay. They are providing cattail control resulting in increased interspersions and greater waterfowl attractability.

V. 1996 Water Management Objectives

Water management activities for 1996 are as follows: 1) Fall, winter, and spring runoff and artesian well water will be held as high as possible prior to the nesting season; 2) During the nesting period, water levels will be gradually lowered 6 inches to 1 foot in order to concentrate invertebrates within the water column and along the shoreline for use by nesting hens; 3) With the appearance of broods, water levels will again be lowered by 6 inches to 1 foot to provide access to invertebrate resources contained within the submerged aquatic bed; and 4) By mid to late summer, attempts to maintain and increase water levels will be initiated.

Attempts to rehabilitate and determine the functionality of the Prairie Ponds' system will be initiated. Complete drawdown of all three units will be completed by June 1. The structures will be assessed and modified or replaced as needed.

WATER UNIT: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA is a 2650 acre tract in Douglas and Charles Mix Counties. Two drainage systems existed on the property when purchased. The Mud Lake Drain has an upstream watershed of 25,600 acres while the second system, the Joubert Drain, has a 12,320 acre watershed. Five ditch plugs or low head dams with concrete stop-log control structures were installed in 1979 along the drainage ditches, two on the Mud Lake Drain and the remaining three on the Joubert Drain. Dam #6 was constructed below dam #2 on the Mud Lake Drain in 1984. Dam #7 on the Joubert Drain was constructed during the fall of 1986 in cooperation with Ducks Unlimited who funded the project design and construction.

A water rights permit for the storage of 131.2 acre feet of water was granted by the South Dakota Department of Water and Natural Resources. The impoundment at capacity covers 56.4 surface acres. The development increased the quantity of pair habitat by creating 5.9 miles of shoreline. The maximum depth is 6.5 feet. Design specifications for the seven dams are as follows:

Embankment Volume YD ³	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 - 76	Unk	6.2	5.7
Dam #2 - 755	Unk	27.9	82.6
Dam #3 - 2761	Unk	43.6	163.0
Dam #4 - 586	Unk	34.7	88.3
Dam #5 - 137	Unk	6.3	5.2
Dam #6 - 900	Unk	30.0	Not determined
Dam #7 - 5470	1526.0	56.4	
TOTAL		205.1	476.0

The capability to manipulate water levels is very limited on the Broken Arrow WPA. Impoundments can be drawn down as objectives

dictate. However, to reflood depends on spring runoff. No capability to flood when desired is possible.

II. Objectives

Habitat for waterfowl production is the primary management objective for the Broken Arrow WPA. The habitat provided also benefits marsh and water birds, shorebirds, gulls, terns, and raptors. Secondary benefits are provided to resident wildlife and livestock used for management purposes.

III. 1995 Water Conditions

The winter of 1994-95 was relatively mild with moderate snowpack in the Broken Arrow drainage. Total precipitation is not monitored on site, however, it was similar to that of Lake Andes NWR which was near normal.

IV. Ecological Effects of the Past Years Water Levels on the Broken Arrow WPA

Heavy spring rains resulted in flood conditions in all pools in the Broken Arrow WPA Complex. Water control structures are not designed to handle the amount of water received resulting in emergency spillways operating at maximum levels. Some spillway erosion occurred resulting in minor damage from prolonged use. The capabilities of the facilities combined with excessive amount of water provided high water conditions in all pools. This high water limited the production of certain aquatic plants that contribute to the overall production capability of the Complex. Having only moderate control of water management as dictated by the facilities currently in place, proves to be very frustrating. Aside from an excessive amount of water, it was noted that waterfowl use appeared to be up, a trend that continues for this Complex.

V. 1996 Water Management Objectives

Water management objectives for 1996 are to maintain water levels below those in 1995 in all the impoundments. No pools will be held at maximum level. The largest impoundment will be in a partial drawdown condition for much of 1996. The water level in the large impoundment will be gradually lowered 6 inches to 1 foot in order to concentrate invertebrates within the water column and along the shoreline during the nesting period and to provide growing conditions for emergent and moist soil vegetation. When broods begin to appear, water levels will be lowered again 6 inches to 1 foot to provide access to invertebrate resources. By mid to late summer, the stop-logs will be replaced in the structure in hopes that precipitation will begin to fill the impoundment for the fall migration.

The five water control structures were retrofitted in 1991. They replaced the non-functional stop-log liftgate structures.

WATER UNIT: Karl E. Mundt National Wildlife Refuge

The Karl E. Mundt NWR borders the Missouri River in Gregory County. The refuge was established in 1974 to protect habitat important to wintering bald eagles. The only water on the unit itself is located within four small (less than 1 acre) stock ponds that are used in conjunction with the grazing program, and a one half acre pond fed by a free flowing artesian well. There is presently no active management of water on the Karl E. Mundt Refuge.

**WATER UNIT: Sherman Waterfowl Production Area
SD Water Permit No. 5251-3**

This water permit is for sufficient runoff water annually to fill the Sherman WPA to elevation 1591.7 feet msl. The Sherman WPA is located in a portion of the W $\frac{1}{2}$ Section 3; E $\frac{1}{2}$ NE $\frac{1}{4}$ Section 9; NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 10; all in T. 98 N., R. 66 W., Charles Mix County. The permit establishes first priority to 271 feet of an undivided interest in a total of 323 acre feet of water stored in a natural basin on both the Sherman WPA and private land at elevation 1591.7 feet msl. The water appropriated shall be used for the purpose of providing fish and wildlife habitat.

**WATER UNIT: Varilek Waterfowl Production Area
SD Water Permit No. 5250-3**

This water permit is for sufficient runoff water annually to fill the Varilek WPA to elevation 1614.0 feet msl. The Varilek WPA is located in the E $\frac{1}{2}$ Section 11, T. 98 N., R. 66 W., Charles Mix County. The permit establishes first priority to 139 acre feet of an undivided interest in a total of 190 acre feet of water stored in a natural basin both on the Varilek WPA and private land at elevation 1614 feet msl. The water appropriated is used for the purpose of providing fish and wildlife habitat.